Management of Combined Sewer Overflow-A Research Program Capstone

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This capstone (a term chosen because it refers to the topmost part of a structure) report fully documents the outcome of a major research program and identifies the impact of those outcomes. It provides a basic overview of the U.S. government's involvements in developing countermeasures for combined sewer overflow (CSO) pollution. The National Urban Wet-Weather Flow Management and Pollution Control Research Program was initiated in 1964 when the nationwide significance of pollution cause by storm-generated discharges was first identified. Up to the present time, a total of more than 350 intramural and extramural projects (e.g., contracts and cooperative agreements) totaling approximately $125,000,000 in funding support have been conducted. These program projects have resulted in approximately 1,000 publications.

CSO is one of the three major types of urban wet-weather flow (WWF) discharges. It is a mixture of storm drainage, municipal-industrial wastewater, and subterranean infiltration discharged from combined sewers or dry-weather flow discharged from combined sewers due to clogged interceptors, inadequate interceptor capacity, or malfunctioning CSO regulators. Untreated overflows from combined sewers have proven to be a substantial pollution source in terms of impact on the quality of the receiving water body. Problem constituents in CSO include visible matter, infectious (pathogenic) microorganisms, oxygen-demanding materials, suspended solids, nutrients, and toxicants (e.g., heavy metals, pesticides, and petroleum hydrocarbons). The average five-day biochemical oxygen demand (BOD_5) concentration in CSO is approximately one-half that of raw-sanitary wastewater.

This Capstone Report covers CSO characterization and receiving water body impacts and describes all methods to manage CSO in the urban watershed, including land management or source control, storage, treatment, disinfection, and system optimization. It presents control methods that can be used by municipalities developing Long-Term CSO Control Plans (LTCPs). The projected total national costs for CSO pollution abatement are in excess of $50 billion.

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